circumstances, was a conspicuous object. The statement of the Chinese historian that "it appeared nearly as large as a Tow measure,"[*] though somewhat indefinite, certainly justifies the conclusion that its magnitude has greatly diminished during the last 500 years. The meteors moving in the same orbit are doubtless the products of this gradual separation.

9. The bipartition of Biela's comet in 1845, as well as the non-appearance of the two fragments in 1865, when the circumstances were favourable for observation, are too well known to require more than a passing notice.

The comet of Halley, if we may credit the descriptions given by ancient writers, has been decreasing in brilliancy from age to age. The same is true in regard to several others believed to be periodic. The comet of A.D. 1097 had a tail 50° long. At its return, in March 1840, the length of its tail was only 5°. The third comet of 1790 and the first of 1825 are supposed, from the similarity of their elements, to be identical. Each perihelion passage occured in May, yet the tail at the former appearance was 4° in length, at the latter but $2\frac{1}{2}$°. In short, instances are not wanting of this apparent gradual dissolution. It would seem, indeed, extremely improbable that the particles driven off from comets in their approach to the sun, forming tails extending millions of miles from the principal mass, should again be collected around the same nuclei.

The fact, then, that comets and meteors move in the same orbits is but a consequence of that disruptive process so clearly indicated by the phenomena described. In this view of the subject, comets—even such as move in elliptic orbits—are not to be regarded as permanent members of the solar system. Their *débris*, however, thus scattered through space, and subject more or less to planetary perturbation, may casually penetrate the atmosphere, producing the phenomena of sporadic meteors.

DANIEL KIRKWOOD

NEWTON'S MANUSCRIPTS AND BIRTHPLACE

ALL Trinity men will, like myself, regret that Lord Portsmouth's gift, recorded in NATURE of June 6, should have been made to the library of Newton's University instead of to that of Newton's College. Surely for many reasons Trinity library is the most fitting depository for the Newton manuscripts. A catalogue of these papers is given in Collet's "Relics of Literature, 1823," pp. 190-194, consisting of eighty-two manuscripts, said to cover nearly eight thousand pages, mostly quarto or folio, besides six note-books, and many letters to Newton in English, French, and Latin. Unfortunately many of these papers relate to biblical or theological subjects.

When Dr. Pellet, by request of Newton's executors, examined these papers with a view to publication, he condemned all but five. These were :—

α 56 half sheets in folio, *De Motu Corporum.*

β 31 half-sheets in folio, being paradoxical questions concerning Athanasius (*sic*).

γ 12 half-sheets folio, an abstract of chronology, and 92 half-sheets folio, the chronology.

δ 144 quarter-sheets, and 95 half-sheets folio, being loose mathematical papers.

ϵ 40 half-sheets folio, the "History of the Prophecies," in ten chapters, and part of eleventh unfinished.

Of these γ was to have been printed, and α, β, and parts of δ and ϵ were to be reconsidered.

While on this subject, permit me to add an account of the present state of Newton's birthplace sent me by a lady at Stoke Rochford, where Newton attended a dame's school before going to the free school at Grantham :—

"Woolsthorpe, the birthplace of Sir Isaac Newton, is about half-a-mile westward from Colsterworth, and nine miles from Grantham. It has been thoroughly repaired by its present owner. At the top of the staircase, in a room to the left, Newton was born on Dec. 25, 1642. Over the fireplace is a small white marble slab recording the fact, with the well-known lines parodying Genesis i. 3. The only things in this room which remain unchanged since Newton's time are the door, which is massive, and rather ornamental in its workmanship, and a small cupboard close to the fireplace, the door of which is curiously carved. In another room a singular piece of furniture, made of wainscoting, stands in one of the corners, which looks like a small apartment taken from the main room. It is said to have contained Newton's books, instruments, &c. Above the door in front there is a shield with cross-bones, and a few words to denote that the house was the birthplace of Newton. The sun-dial which Newton made and put upon the south side of his house was sent to the British Museum some thirteen or fourteen years ago."

C. M. INGLEBY

NOTES

WE are informed that Dr. Sharpey, who has for so many years filled with such great advantage to Science and personal distinction the post of Biological Secretary to the Royal Society, has recently sent in his resignation of that appointment. There is a very general hope among Fellows of the Royal Society that Prof. Huxley may allow himself to be nominated as his successor.

AT the meeting of Convocation of the University of Oxford, held last week, the honorary degree of D.C.L. was conferred on the following gentlemen :—Samuel David Gross, M.D. and LL.D., Professor of Surgery in the Jeaffreson Medical College of Philadelphia; Sir Benj. Collins Brodie, Bart., M.A., F.R.S., late Waynflete Professor of Chemistry; George Burrows, M.D., of Caius College, Cambridge, F.R.S., President of the Royal College of Physicians of London, and formerly President of the General Medical Council.

THE choice of the electors of the Waynflete Professorship of Chemisty at Oxford, vacant by the resignation of Sir B. C. Brodie, has fallen on Prof. Odling, F.R.S., who at present holds the position of Fullerian Professor of Chemistry to the Royal Institution, and Examiner in Chemistry to the University of London.

MR. EDWIN RAY LANKESTER, B.A., late junior student, Christ Church, has been elected to a Natural Science Scholarship at Exeter College, Oxford. Mr. Lankester was elected to the Burdett Coutts Scholarship in 1869, and to the Radcliffe Travelling Fellowship in 1870. There were four candidates.

IN accordance with the intimation which we gave last week, Mr. G. B. Airy has been gazetted a K.C.B., a graceful acknowledgment of the claims of representative men of science to recognition by the State.

WE have to record the death, on the 16th inst., in his 82nd year, of Colonel W. H. Sykes, F.R.S., M.P. for Aberdeen. He was a distinguished officer of the East India Company, and occupied the post of chairman of its Board of Directors at the time of the surrender of its Imperial functions. Colonel Sykes was always a firm friend to scientific research, and was himself possessed of no mean scientific attainments.

MESSRS. C. F. J. YULE and W. J. SOLLAS have been elected to Foundation Scholarships for proficiency in Natural Sciences at St. John's College, Cambridge. Each has been twice placed in the first class in the College Examination in Natural Sciences, and Mr. Sollas obtained in 1870 the exhibition of 50*l*. per annum offered by the College for competition to students in Natural Science not yet members of the University.

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[*] Williams's "Chinese Observations of Comets," p. 73.

THE following is the list of those who have passed the special examinations in Natural Sciences for the ordinary B.A. degree at the University of Cambridge:—Chemistry—First Class: Porter, Clare; Loder, Trinity; Dent, Trinity; Corbet, St. John's. Second Class (in alphabetical order): Flood, Jesus; Savary, Trinity; Thomas, St. John's; Winder, Christ's. Geology—First Class: Jesson, Trinity. Botany—First Class: Smith, Christ's; Gibb, Down; Standert, Corpus; Norcock, Corpus. Second Class (in alphabetical order): C. W. H. Evans, Caius; Gibson, Christ's; Hamilton, St. Peter's; Hughes, Clare; Norton, Clare; Tamberlain, Trinity. Ægrotat: Moore, Corpus. Zoology—First Class: Bird, Trinity. Second Class (in alphabetical order): Campbell, Caius; Clutton, Clare; Leatham, Trinity.

SCIENCE has sustained a great loss in the West of England by the death of Mr. J. S. Enys, of Enys, near Penryn. In conjunction with Sir Charles Lemon and Mr. Davies Gilbert, he assisted science in every way that one of the largest landed gentlemen in the county could do. The Falmouth Polytechnic, and most others of the Cornwall scientific institutions, will miss the support which Mr. Enys so largely and constantly afforded them. Many of his geological and kindred works have been printed in the "Proceedings of the Royal Cornwall Institution," and by liberal subscription he assisted scientific periodical literature. He died, an ardent nature-worshipper, in his 76th year.

MR. GREGORY, the new Governor of Ceylon, we are happy to hear, not only takes great interest in the wonderful archæological treasures of the island, but also intends to do his best to promote the course of science there. A regular curator, a zoologist, will probably be appointed to the Colombo Museum, and if he does half as much work amongst the fauna of Ceylon as Mr. Thwaites has done amongst the flora, biological science will profit in no small degree thereby. We wish Mr. Gregory all success, and hope he may secure a good man for the post.

THE great provincial meeting of the Royal Horticultural Society will be held next week at Aston, near Birmingham, and promises to be a brilliant one. The proceedings will be opened on Tuesday, the 25th inst., by H.R.H. Prince Arthur.

PROF. HUMPHRY commenced his course of three lectures on Human Myology at the Royal College of Surgeons on Monday last. He spoke of the various provisions, such as obliquity of the direction of fibres, insertion near the centre of motion, passage through loops, &c., which are for the purpose of lessening the range of muscular action required, and so of shortening the fibres of muscles. The mechanical disadvantage resulting from this is, he observed, more than compensated for by the greater number of fibres brought to bear by means of tendons upon given points, and by the convenience of massing the fibres in certain positions, as well as by greater strength in the muscle itself. He next entered into the morphology of the muscles of the trunk, neck, and head. All of these he regarded as modifications of, or derivatives from, that structure which in the fish forms the great lateral muscle; and he showed how the parts corresponding with the septa of the lateral muscle sometimes form inscriptions in the muscles, and sometimes become converted into tendons, as well as into osseous and cartilaginous structures. This subject was discussed at considerable length. In speaking of the intercostal muscles, he gave mechanical reasons for believing that both the external and the internal intercostal fibres are, in their whole extent, agents in inspiration, and that the internal intercostals do not, as they have been supposed to do by some authors, act as depressors of the ribs at parts of the intercostal spaces.

A PAPER will be read at the Horological Institute on Tuesday, June 25, on "The Compensation and Adjustment of the Hemispherical Cup Arms of Velocity Anemometers," by Mr. John James Hall, F.M.S.

THE Franklin Society of Mobile was organised in the year 1835, under charter of the State of Alabama, for the purpose of promoting intellectual culture, literary taste, and other kindred objects. Its operations were suspended a little before the outbreak of the late American war, in consequence of the destruction of its hall, furniture, and a part of its library by fire, and have only recently been resumed. A suitable building has been purchased and remodelled, and arrangements are in progress for the inauguration of lectures and for the extension of the privileges of the Society's library beyond its own membership to the public at large. The library, however, is as yet but limited, and the ability of the members of the Society has been well nigh exhausted in the expenses incident to the purchase and fitting up of a new building. At a recent meeting it was resolved that a committee be appointed to correspond with the officers of similar societies in the several States, and with such other persons as the committee may think proper to address, and to request donations or loans of books, manuscripts, paintings, engravings, or other works of art. We commend the movement to those who have the means and inclination to contribute to objects of this nature. Shipments may be made to the "Franklin Society, Mobile, Alabama," the freight on which will be paid by the Society; or parcels may be sent to W. E. Mickle, Secretary Mobile Franklin Society, care of E. Stock, 62, Paternoster Row.

THE Austrian Government steamer *Admiral Tegethoff* sailed from Bremen on Thursday last, on its North Pole expedition. A farewell banquet, at which Count Zichy and Dr. Petermann were present, was given to the members of the expedition at Geestemunde.

IT is reported that the Emperor of Russia is projecting the junction of the Black Sea with the Caspian by a short canal connecting the Manutch, an eastern tributary of the Don, with the Kerma, a river running into the Caspian. The total length of the communication will be 680 versts, or 90 German miles; but the length of the canal will be only about one German mile. The piercing of the mountain which separates these rivers will, however, be an engineering work of gigantic magnitude, and is calculated to require the labours of 32,000 workmen for six years, and to cost 81,000,000 roubles.

PROF. DAWSON, F.R.S., delivered the Annual Address to the Natural History Society of Montreal on May 18. In it he strongly attacked the Darwinian theory of Evolution, which, in its extreme form, he considered had a tendency to "prostitute natural history to the service of a shallow philosophy," and to lead to "the destruction of science, and a return to semi-barbarism." He held that his researches on the shells of the Gulf of St. Lawrence and the coasts of Labrador and Greenland, showed that it was impossible that any changes of the nature of evolution were in progress; but that all these species had remained the same, even in their varietal changes, from the post-pliocene period till now. Principal Dawson then referred to the controversy raised by Dr. Sterry Hunt with regard to the use of the names Cambrian and Silurian in geology; and concluded with a sketch of the recent operations of the society in dredging the Gulf of St. Lawrence.

THE members of the Australian Eclipse Expedition, if they were unsuccessful in the primary object of their voyage, saw some strange things along the shores to the north of the great continent of Australia. Mr. Foord tells a wonderful story, "amply attested by witnesses," of a fish with four hands. This extraordinary creature was found crawling on a piece of coral dredged up from the bottom of the sea. "The body was that of a fish," says Mr. Foord before the Royal Society on January 22, "but wonderful to relate, it had in the place of fins four legs terminated by what you might call hands, by means of which it made its way rapidly over the coral reef. When placed on the sky-light of the steamer, the fish stood up on its four legs, a sight to behold! It was small, and something like a lizard, but with the body of a fish!" It is to be hoped that a full and scientific description of this latest marvel of deep-sea dredging may soon be published, as the specimen appears to have been brought back to Melbourne. Mr. White, too, of the same Expedition, tells strange tales about the rats. "The little island," he said, "upon which we pitched our tent was overun with them, and what was most extraordinary, they were of every colour from black to yellow, and some tortoise shell!"

AMONG other collections made by Prof. Marsh during his explorations in 1871 were additional specimens of the pterodactyl, first obtained in 1870. Portions of five individuals were procured; and among them nearly all the bones of the right wing of one, which exhibited the pterodactyl structure in its perfection. The teeth found with the other remains were somewhat similar to those of the pterodactyls of the Cretaceous of England, being smooth, compressed, elliptical, and somewhat curved. A second species, still larger than the other, was obtained in the Upper Cretaceous, near the Smoky River, in Western Kansas. The expanse between the tips of the fully-extended wings was probably as much as twenty-two feet. In all, Prof. Marsh has determined the existence of three species from the same region, which he characterises in the April number of the *American Journal of Science*. In the same journal Prof. Marsh refers to the interesting discovery that the body of mosasauroid reptiles was probably covered with plates, as in some crocodiles, the head itself being smooth. This fact has been ascertained in regard to specimens of all the American genera, so that probably all the species possessed it.

THE second Report of the Geological Survey of Indiana, made during the year 1870, under the direction of Mr. E. T. Cox, State geologist, has just made its appearance, and, like its predecessor, appear to be a work of much scientific value. In addition to the series of reports upon the geology of the counties, it embraces a paper upon the Western coal measures and Indiana coal, and a paper upon palæozoic zoology, and closes with an extended manual of the botany of Jefferson County, Indiana, prepared by Prof. A. H. Young, of Hanover College. In this the total number of indigenous species is given at 537, those introduced numbering 72.

ANOTHER book of excellent typographical execution has just appeared from the public printing-office of the United States, in the form of the astronomical and meteorological observations made at the United States Naval Observatory during the year 1869, under the direction of the superintendent, Admiral B. F. Sands. This volume, forming a stately quarto of over 900 pages, is prefaced by a detailed account of the transit circle, the meridian transit instrument, the mural circle, and the equatorial of the observatory, and followed by a statement of observations made with these instruments. The volume also contains the meteorological observations for 1869, the positions of the sun, moon, and planets during that year, as made with different instruments, &c. The report of the total eclipse of December 22, 1870, which has already appeared as a separate memoir, is included in this volume, as also an appendix embracing the zones of stars observed with the mural circle in the years 1846, 1847, 1848, and 1849. The observatory is now in excellent condition, and includes in its working force some of the best astronomers and mathematicians of the country; among them Profs. Newcomb, Hall, Harkness, Eastman, &c. The completion of the gigantic telescope now in process of construction by Alvan Clark will constitute an important addition to the means of research, and will doubtless be turned to good advantage.

ON THE SOUND MADE BY THE DEATH'S HEAD MOTH, "ACHERONTIA ATROPOS"

THE singular cry produced by the Death's Head Moth has for a long time been known to naturalists, and the question of the exact method of its production has given rise to much discussion. To judge, however, from the latest writings on the subject, the matter is considered even now as being far from definitely elucidated. In the autumn, about six years ago, I was lucky enough to rear over a hundred imagos of *Acherontia atropos* from pupæ obtained from potato diggers in the neighbourhood of Bristol. I made then some observations on the production of the sound in question, but I did not consider them as sufficiently perfect for publication. I got no more specimens until last autumn, when I obtained a single imago from ten pupæ, but on this I made an experiment which I believe to be crucial in the matter. Absence from England, however, on the Government Eclipse Expedition, has prevented my giving an account of my experiment until now.

On looking into the literature of the subject, in which task I have been kindly assisted by Prof. Westwood and Prof. Rolleston, I found it in its extent far exceeding my expectations. The number of theories which have been invented to account for this apparently simple phenomenon is astonishing; and as the history of the question is really very interesting, I shall commence by giving as complete an account of what has been written on the subject as I have been able to obtain by reference to works in the Radcliffe, Bodleian, and Linnean Society's libraries, and in that of Prof. Westwood.

The earliest writer on the subject was Reaumur (Mémoire pour servir à une Histoire des Insectes, 1734-1742, vol. i. pl. 14), who suggests that the noise is most probably due to the same cause as in certain scarabei, which produce a sound by the rubbing together of certain of their scaly parts. Later on (*loc. cit.* vol. ii. p. 24) Reaumur states that he has made further experiments, and concludes that the sound is produced by the rubbing of the proboscis against the palps. He held the palps aside from contact with the trunk, and the sound ceased. But he is of opinion that air may have something to do with the matter, and makes his statement with caution. There is a membrane stretched at the base of the trunk, he says, which may have something to do with it; and finally, "Je ne me lasserai point de répéter que nous dévons nous attendre, que dans les plus petits sujets il restera toujours quelque chose que nous ignorons." It would have been well if some of the many subsequent writers or the subject had profited by this sage remark. The next autho- is Roesel (Insecten Belustigung: Nürnberg, 1755, § 16), whose observations, according to Wagner, were very superficial; and who considers the sound due to friction between the opposed surfaces of the abdomen and thorax. Next comes Rossi (Istoria della Farfalla a testa di Morto, Opuscoli di Milano, Ann. 1782) who is the first to arrive at a correct result, and says the sound is due to expiration of air through the trunk. Schröten (Der Naturförscher, xxi. Stück: Halle, 1785) gives as a cause the rubbing of the trunk against the head. Engramelle, as quoted by Passerini, without special reference, makes the sound come from the part of the insect called the spallette.

There is now a considerable chronological interval, and then Godart and Duponchel (Hist. Nat. des Lépidoptères de France. par M. Godart. tom. iii. pp. 18 et 19) report a letter from M. Lorey, retired army surgeon-major, who describes a peculiar pair of organs, situate on the sides of the abdomen, surrounded by long hairs, which, when the animal squeaks, may be seen to elevate themselves, and form a conical cavity leading to an opening. He considers the sound to be produced by the passage of the air through this opening. It will be seen further on that this peculiar pair of organs was subsequently described as a discovery by two writers ignorant of the literature of the subject.

Next comes Passerini, who went to the very root of the matter, and explained the whole thing correctly and clearly in a monograph entitled, "Osservazioni sopra la Sphinx Atropos o Farfalla a testa di Morto," del Dottore Carlo Passerini: Pisa, 1828. He commenced his experiments in 1824. He first disposes of Lorey's theory by showing that his peculiar organs exist only in the male insect, whereas both male and female Death's Heads produce the sound; and further, that the same organs exists in the males of other moths, as *Macroglossa stellatarum*, and *Sphinx convolvuli*, which produce no sound. Next he records this startling experiment:—A moth may be divided in two through the middle of the thorax, and the anterior extremities will still continue